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UTERINE OSMOSIS.

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OF NEW YORK.

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AMONG the principal modern discoveries that have contributed to the preëminence of gynecology we recognize especially those of anesthesia, antiseptis, and the adaptation of atmospheric pressure as utilized by the illustrious Sims in the application of his duck-bill speculum.

The object of this paper is to call attention to the availability of certain other physical forces—those of translatory molecular motion, and known as osmosis and capillarity—as most efficient aids in the treatment, and as *preventives*, by early treatment, of some of the diseases peculiar to women, that, once developed, are incurable by any device of surgery.

It has been repeatedly demonstrated in practice that these laws may be made as successfully operative for curative purposes in all conditions of disease of the female pelvic organs characterized by *congestion* or *engorgement* as they can be illustrated by osmotic apparatus in the laboratory.

The human system abounds in capillary materials that have, to a limited extent, been utilized by the physician, notably in effecting medication by the hypodermatic syringe and in vaccination.

The same principle that governs the absorption



of medicine placed among the lymphatics anywhere under the skin may be made operative among the same class of vessels under the mucous surfaces, through which they communicate by myriads of infinitesimal pores.

The lymphatic system, as is well known, has long been regarded as the principal group of vessels accomplishing absorption.

It was vaguely hinted at as having some form of existence, undefined and without its present name, as long ago as in the time of Hippocrates and Aristotle, and has since engaged the best efforts of the ablest anatomists and physiologists in the successive centuries and among all enlightened nationalities, working out to its present status our knowledge of this system as a unity.

That no valvular arrangement is found in the most numerous, smallest, and peripheral lymphatic vessels is favorable to making use of them for osmotic purposes.

The lymphatics are remarkable for their exuberance and anastomoses, especially in the female intrapelvic organs. Profusely, however, as they are distributed in and around the uterus, they are even more abundant in and around the ovaries.

These innumerable lymphatic vessels form infinite inosculations and merge into more tangible branches.

Branches from the cervix, together with branches from the vagina, coalesce to form trunks that enter the internal iliac and sacral glands, and branches from the uterus, ovaries, Fallopian tubes, and rectum also converge and enter the lumbar glands.

These intercommunicating lymphatic channels form a circuit through which osmosis of the uterus and vagina reaches neighboring organs involved in congested conditions requiring treatment.

Endosmosis of medicated fluids at the uterine and vaginal point of these congeries or anastomoses of lymphatics will influence the entire circle; and simultaneous exosmosis will, in its turn, effect drainage and depletion, not only of those parts to which the medicinal application is immediately in contact, but others adjoining them.

That portion of the vascular system next in importance for the purposes we are considering is the capillary system of bloodvessels.

Some physiologists claim that these networks of minute tubes connecting the terminations of the arteries with the beginnings of the veins exercise a greater power of absorption than the lymphatics.

It is sufficient that both, being all-pervading and intermingling in unnumbered myriads, are equally subject to the laws of capillarity and osmosis.

The endosmometer, as illustrated in works on physics, is a very simple contrivance, but it explains some of the most important of Nature's laws.

Many interesting experiments are illustrated in works on physics demonstrating the phenomena of osmosis, and others concerning the double current of different liquids passing each other in opposite directions through the same tube, of even the finest possible bore, under the combined influence of capillarity and diffusion.

The general law is that when endosmosis is in operation exosmosis is also present; but, exception-

ally, in some cases, movement is only in one direction.

The simple movement of exosmosis is strikingly illustrated by the action of glycerin upon the mucous surfaces of the os and cervix uteri, inducing a profuse outpour of serum.

For many years advantage has been taken of this to deplete the uterus, so as to gain absorption of medicines locally applied, upon the principle that prompted physicians of the olden time to bleed their patients just before giving medicine, to promote its absorption.

The other half of this problem, however the fact that the uterus is susceptible of medication by endosmosis, is a discovery of recent date, especially as to the capacity of this organ to be operated upon by both osmotic forces simultaneously.

In the artificial endosmometer we have a membrane interposed between two liquids of different density. A double current sets in, each liquid passing the other at the same time, on its way through the capillary tubes or pores of the membrane.

It is well known that in the anatomy of the female, the mucous membrane of the vagina, of the os, of the cervix, of the cavity of the uterus, and of the Fallopian tubes, is one continuous expanse of capillary orifices, living, absorbing tubes or pores.

This membranous expanse of living orifices comprising the mucous surfaces stands, in the *human* endosmometer we purpose to demonstrate, in the same relation as to mechanism as the dead membrane in the artificial endosmometer occupies, and

the living membrane is correspondingly more active for osmotic work.

It is only necessary, in order to institute osmotic operations upon the uterus, to complete the relations suitable for maintaining medicated fluid in direct apposition with the mucous membrane of the organ by means of a material composed of soft, porous, clustered tubes in which capillary action may take place.

For this purpose nothing has, so far, been found superior to the fine Syrian sponge made surgically clean, bleached, and kept for use in antiseptic fluid until required.

By bringing such a sponge into contact with the os, the cervix, and the vagina, we have multitudes of capillary tubes on each side of a living membrane, itself permeated by myriads of infinitesimal pores; the whole forming a superior endosmometer, and, if the sponge *in situ* is saturated with a suitable fluid of low density the phenomena of osmosis becomes demonstrable.

Experience has amply demonstrated that, with these relations maintained, endosmosis of an aqueous medicated fluid in the sponge occurs; this being of lower density passes through the pores of the mucous membrane, to be absorbed by the lymphatic and capillary vessels of the organs. At the same time, exosmosis of the heavier fluid-deposits incident to congestion or inflammation takes place, the excretions passing out into the sponge.

We thus form an endosmometer within the vagina, which will simultaneously medicate and drain the entire circle of lymphatic and capillary inosculation in the pelvis.

The osmotic properties of sponge were, several years ago, referred to by Dr. McCourt of New York.

Since then cases have presented in my practice in which it seemed desirable to facilitate relief of more deeply-seated engorgements of the pelvic organs by extending osmotic influences more directly within the recesses of the uterus and Fallopian tubes than the sponge alone could reach.

This I accomplished by introducing through the cervix a small spiral-wire tube covered with a woven texture, and containing within its caliber capillary filaments constituting a wick, each extremity projecting beyond the tube about half an inch.

This tube being passed within the os internum, the capillary filaments rest upon the intra-uterine mucous surface, while the saturated sponge, being placed *in situ*, holds the lower extremities of the filaments; and capillarity and endosmosis convey the fluid from the sponge up within, to be diffused upon and absorbed by the endometrium. The tube is made slightly bulbous at the extremity to be introduced, and of a length to just pass through the cervix. The bulb aids retention and the spiral form preserves the filiform wick from being pressed upon in its caliber.

The extremities of this wick extend beyond the spiral tube, so that the upper one lies in direct contact with the endometrium, while the lower end is imbedded in the saturated sponge placed against the os and cervix.

By this arrangement osmosis is brought into play upon the endometrium and Fallopian tubes directly, while it does not interfere with the same process

going on between the sponge and the vaginal portion of the uterus.

As the fluid in the sponge is drawn up the wick by capillary attraction it becomes diffused slowly upon the mucous lining of the uterine cavity and Fallopian tubes, to become absorbed by their vessels, and we get direct endosmosis and exosmosis without any shock, as is so liable to follow injection of fluids into the uterine cavity by using a syringe.

It has been of common occurrence in cases of chronic congestion and inflammation of the uterus and its adnexa, upon the removal of this apparatus—after about twenty-four hours—to find it saturated with puriform, sanious, or mixed excretions; and this, too, when the most careful examination of all of its surfaces visible by the Sims method failed to find an ulcer or other solution of continuity to account for the puriform discharge.

The purulent or other product found in the apparatus represents the *exchange* effected during osmosis, the liquid of lighter density passing inward, while the liquid of heavier density passes outward from the diseased tissues.

It might seem that it would be difficult to use the intra-uterine capillary tube, but the very conditions of disease of the uterus especially requiring this plan of medication and drainage are accompanied by dilatation of the os, cervix, and the uterine cavity.

It is, in addition, an important element of the law of capillarity that it works in a vacuum, or without reference to the presence of air, quite as

well as in open space, even assuming that the closed uterus could maintain a vacuum.

The filiform fibers constituting the wick in the intra-uterine spiral-wire tube will raise the fluid from the saturated sponge in contact with the endometrium and the orifices of the Fallopian tubes with as much ease as the wick in the familiar house-lamp serves to raise even a heavy oil to a height of several inches; or, as the osmotic action causes the ascent of sap in trees.

In practice, water and alcohol, our best solvents for the remedies most available in osmotic medication, are, fortunately, the fluids most susceptible to osmotic influence.

Local medication of the uterus in the old routine is nearly useless in cases of marked version or flexion of the organ causing a degree of bending and compression sufficient to keep up engorgement. In such cases the capillary spiral tube not only maintains the cervical canal patulous, but the sponge may be utilized both as a pessary and as a fountain for osmosis.

The sponge to be used as a pessary is first to be wrung out of the medicated fluid as nearly dry as possible, and, after being placed *in situ*, a long-nozzled syringe is to be used to saturate it with the fluid.

The distention of the sponge by the fluid maintains the uterus upon a soft, elastic support, much superior to many other more expensive appliances for this purpose.

It is manifestly impracticable, in the limits of this paper, to enter into a detail of all the conditions

treated in works on gynecology and point out specifically wherein this system of osmotic treatment may be beneficially substituted for the old routine.

We are justified in stating that the osmotic plan of treatment is indicated in *all* stages of congestion, engorgement, or inflammation of the vagina, uterus, Fallopian tubes, ovaries, peritoneum, rectum, or other tissues whose lymphatic and capillary vessels anastomose with those of the vagina and uterus..

Osmosis of the two last-named organs will similarly influence the others.

If we were to specify conditions in which an improvement in treatment has long been sought, we would say that those of ovarian inflammation, puerperal septicemia, and the engorgement incident to subinvolution are conspicuous and are influenced by osmosis more than by any other plan of medication.

Speaking of the prognosis of chronic ovaritis, Prof. Thomas makes the following admission: "I know of few curable disorders which I so dread to meet as this. The day will probably come when our treatment for it will be satisfactory and efficient, but it has not yet done so by any means. Many cases will entirely baffle treatment, while all will prove little amenable to it. That they often recover is true, but recoveries have, in my experience, but little connection with treatment."

In the matter of treatment Prof. Thomas expresses regret that he has nothing better to offer than the old methods, and concludes as follows: "It is now six years since the publication of the last edition of this work (*Diseases of Women*), and during that

time no disease has more especially commanded my close scrutiny than this, and yet, in an amended edition after that lapse of time, I find myself unable to offer any improvement upon what was written then."

Regarding the prognosis given by Dr. Thomas that "the day will probably come when treatment of ovarian inflammations will be satisfactory and efficient," it is our conviction, based upon experience, that the day *has come* and that the "satisfactory and efficient" treatment of ovaritis is that by medical osmosis.

It is our belief further that this osmotic plan of medication will prove of great value as a prophylactic, preventing septicemia, through the prompt neutralization of septic conditions such as arise in puerperal and syphilitic cases, and, by equally prompt relief of conditions of engorgement of the pelvic organs will prevent disorganization of tissues, which, being allowed to happen, forms the starting-point of abnormal growths, and these, if there be constitutional predisposition, are liable to degenerate from benign into carcinomatous tumors.

Ninety per cent. of cases of puerperal fever occur within three days after confinement.

In endometritis following puerperal infection the after-pains are unusually severe; the lochial discharges become retarded and fetid; the temperature, following a chill, rises often to 104° or higher; the pulse, small and hard, increases from the normal to 120 or even 160 beats in the minute.

When, in any case, after confinement, symptoms of septic intoxication occur, at once flush the vagina

with antiseptic douches, and, by the use of the wire curette and the applicator, remove the débris—such as particles of placenta and plugs of bloody mucus—from the neck and the body of the womb and apply the sponge saturated with an anodyne and an antiseptic solution to the os and cervix.

Osmosis of the uterus will be effected, causing the lochial flow to be resumed, its fetor to disappear by the antiseptis, and the temperature and pulse to become reduced as the medication and drainage of the uterine cavity proceed.

In such cases the sponge should, for the first few days, be removed at least night and morning, and be cleansed by washing in water (containing spirit of ammonia), carbolized, re-medicated with an aqueous solution of carbolic acid, morphine, and glycerin, or other suitable mixture, as the physician may elect, and replaced in direct contact with the os and cervix, to maintain osmosis.

The anodyne-antiseptic mixture should, between replacements, be occasionally injected to keep the sponge *in situ* saturated as well as to promote vaginal cleanliness.

Post-mortem examinations by Championnier, Leopold, and others, show that in puerperal inflammations the lymphatics are commonly filled with pus; and, according to Courty, chronic inflammation of the female pelvic organs confined almost to the lymphatics themselves, of this region, is a common occurrence. Hence the importance of promptly unloading these vessels and relieving the engorgement of the uterus, so as to arrest local disorganization and neutralize blood-poisoning.

I have no doubt that morbid growths have their origin in some one or more of the involved lymphatic or capillary tubes that become obstructed during protracted congestion, and, unable to float away the clog, disorganization follows.

It would thus seem easy to account for the frequency of such morbid growths in the uterus and ovaries, considering the great number of women who suffer repeatedly from protracted congestions of these organs during the years from puberty to the menopause.

If these repetitions of congestions do, in time, constitute the focus of an abnormal growth in the uterus, the ovaries, or in some contiguous tissues, it follows that, if the congestions are promptly relieved or prevented by osmotic treatment from becoming protracted, there may be fewer women in the future applying for the removal of tumors and carcinomatous growths by *surgical* measures.

We cannot too strongly emphasize our belief that the intelligent employment of the osmotic plan of treatment set forth will, in time, be found to have lessened the records of uterine and ovarian cases applying for surgical relief.

There is no restraint in the matter of remedies. The physician can choose among the list of antiseptics, anodynes, alteratives, etc., that experience has found useful in regular routine. He must, however, observe the laws of osmosis, which are open to all to study, and a reasonable amount of practice will soon perfect the average practitioner in the management of the uncomplicated apparatus described.

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